REMARKS

By this amendment, claims 1-8 and 13-20 have been revised to place this application in condition for allowance. Currently, claims 1-8 and 13-20 are before the Examiner for consideration on their merits.

In review, all pending claims have been revised to set the upper limit of the amount of carbides in grain boundaries of prior austenite as 0.13 volume percent. No new matter is introduced by this change since this amount is disclosed in Test No. 7 on page 18 of the specification.

Turning now to the prior art rejections, the Examiner has made a new rejection based on United States Patent No. 6,716,291 to Woods and ASM under 35 U.S.C. § 103(a). The rejections based on Miyata and Hara are maintained. In light of the revision to the claims, Applicants traverse the rejections. The traverse is set out below under the headings of the applied prior art.

WOODS

All claims are rejected under 35 U.S.C. § 103(a) based on the combination of Woods and ASM.

Applicants submit that the reasoning used to rejection the claims based on Woods and ASM is in error and the rejection must be withdrawn.

Woods teaches a cast steel having a martensitic matrix structure and consist of, based on weight percent, a) from about 5.0-15% Cr; b) from about 0.5-15% Ni; c) from about 0.1-10% Mo; d) not more than about 2% Si; e) from about 0.1-2% Mn; f) from about 0.1-2%C; g) not more than about 1% Si; h) not more than about 1% P; not more than about 5% Bi; and the balance being substantially Fe, see claim 1 thereof.

Further, Woods makes a statement in col. 3, lines 28-39, as follows:

> It appears that the preferred microstructure from Heat #1 is martensite with no tendency towards the formation of pearlite or other microstructures. When cooled slowly, as in the case of a slow cooled casting, or as in the case of the furnace cool, the alloy transforms to martensite and then self tempers, resulting in a tempered martensite microstructure at room temperature. (emphasis added)

This statement indicates that Woods intends to disclose a method for producing a cast steel, wherein a slow cooled casting is applied to attain a martensitic microstructure and tempered martensite microstructure is formed at ambient temperature by self tempering.

There are at least four reasons why the Examiner's reasoning regarding Woods is flawed and a *prima facie* case of obviousness is not established when using this reference in a rejection based on 35 U.S.C. § 103(a).

1) First, it is patently obvious that Woods is concerned with a cast steel that has a martensitic formation as well as self tempering in the stage of cooling after casting. In contrast, the invention is directed to a martensitic stainless steel with a plastically processed history. The specially cooled and tempered cast steel of Woods cannot be considered to have a **plastically processed history** as is required by the claims. The Examiner cannot ignore the claim limitation regarding the plastically processed history since it imparts a structural characteristic to the steel; it not functional language. Therefore, the martensitic steel of Woods is not in the least similar to that claimed and a *prima facie* case of obviousness does not exist for this reason.

2) Second, the Examiner contends that it would be obvious to incorporate copper into the composition of Woods. The Examiner's reasoning for this is that copper is disclosed in ASM as an alloying element with particular weathering properties. Applicants do not dispute that copper is a known alloying element. However, it is important to consider the context of the prior art when making a modification such as that proposed by the Examiner. Applicants submit that the Examiner's reasoning fails to take into account the teachings of Woods and this failure is error.

There is no reason for adding copper to the composition of Woods. Turning back to the invention, a steel material that is excellent in resistance to sulfide stress corrosion cracking, resistance to wear, and resistance to local corrosion for use in oil well drilling and oil well related transmission and storage has been developed. Paragraph [0013] of the Applicants' published application states the following:

> In view of the problems encountered for the conventional 13% Cr steel, it is an object of the present invention to provide a martensitic stainless steel, which has excellent properties regarding sulfide stress corrosion cracking resistance, the resistance to corrosive wear and the localized corrosion resistance, and which are effectively used in a steel material for a steel pipe used in drilling and production of an oil well as well as for a tank in the transportation and storage of oil, wherein the martensitic stainless steel is produced by properly specifying the chemical composition and at the same time by controlling the hardness and by suppressing the amount of carbides in the grain boundaries.

In the claimed invention, Cu is effective to prevent the ingress of H_2S into the Cr oxides film by forming sulfide in the environment containing a trace of H_2S, and to enhance the stability of Cr oxides further when Mo and/or W co-exist with sulfides. However, neither Woods nor ASM says anything regarding the effects exerted by Cu in this regard. Moreover, neither of these references associates with defining the problem to be solved as being an oil well steel material excellent in resistance to sulfide stress corrosion cracking, wear resistance, and local corrosion resistance. Therefore, there is no motivation to modify Woods with the relevant sentences of ASM and attempt to solve the problem that the claimed invention is drawn to.

3) While there is some similarity in the chemical composition of Woods and the invention, with respect to C, there is only a point overlap at 0.10%. Reverting to the significance of the compositional range of Woods, Woods specifies broad ranges in claim 1. However, the compositions used in the embodiments are those of very limited cases that just fall within the narrow range specified by claim 3 and others. It is appreciated that the disclosure in the prior art is not restricted to the embodiments. However, Woods covers inconceivable distant territory when describing the bounds of the invention, and this distant territory would not be blindly applied for the claimed steel material by one of skill in the art. For example, "not more than 1% S", "not more than 1%P", and "not more than 5%B" describe wide ranges of these alloying elements that one of skill in the art would address with skepticism as to their credibility.

In addition, there is nothing in Woods that describes how to achieve the aim of Woods using the broad ranges and this indicates that Woods has disclosed unreasonably wider ranges than those that could be employed in earnest to achieve the aims of Woods.

The touching of the lower limit of 0.1% C in Woods with the range of C in claim 1 does not establish obviousness since this lower limit has no significance. Based on Woods' examples,

all of which are above 0.15%, one of skill in the art would not find a range of 0.02%-0.10% obvious based on the disclosure of Woods. Put another way, the mere fact that there is a touching of carbon does not mean that one of skill in the art would consider Woods to encompass the much lower range of C defined in the claims.

4) The fact that ASM identifies copper as an alloying element for weathering resistance does not provide a reason to add copper to Woods. Applicants admit that it is well known that making use of copper in weathering steel is common sense for one of skill in the art.

The problem with the Examiner's reasoning is that the Examiner has failed to take into account that Woods' material and its applications are not concerned with carbon steel nor low alloy steel that may be in need of weather resistance. Woods is concerned with applications that require good strength and enhanced wear resistance. There is no mention of the need for atmospheric weather resistance.

Moreover, copper was clearly an alloying element available for use at the time that Woods conceived of the invention. If copper was available as an alloying element as evidenced by ASM, why did Woods not use copper when formulating the alloy? The weathering resistance of copper was presumably known at the time of Woods' invention. Nevertheless, Woods opted to formulate a specific alloy that did not include copper. This is further substantiation that the Examiner's reasoning for now alleging that it would be obvious to employ copper in the alloy of Woods is *prima facie* case of obvious.

The present invention is also unrelated to carbon or low alloy steels or the need for improving weathering of the steel.

Further, what amount of copper would be selected for use in Woods? There is no guidance in ASM in this regard and the rejection fails to provide the required reasoning why the specified copper amount is obvious.

5) To conclude, the rejection based on Woods and ASM is improper and must be withdrawn.

MIYATA AND HARA

Carbide amount

One continuing issue in this application is whether the Examiner can assume that the claimed amount of carbides is present in Hara and Miyata. Applicants have continually insisted that the processing of Hara and Miyata is not similar to that used by Applicants to obtain the claimed amount of carbides and because of this difference in processing, it is not proper for the Examiner to assume that the carbide amount claim limitation missing from each of Miyata and Hara is present.

In the most recent rejection, the Examiner has taken issue with the fact that the previously-submitted Declaration did not draw a distinction concerning the amount of carbides formed at the tempering temperatures of the prior art; the Declaration only stated that the tempering of the prior art of Hara and Miyata produce a large amount of carbides in contrast to that of the invention. More specifically, the Examiner's position can be summarized specifically as follows:

1) Applicants have shown that tempering at 600 °C results in high amounts of carbides at the grain boundaries of the prior austenite, i.e., 0.65% volume.

2) Applicants have shown the either a lack of tempering or tempering at a low temperature, i.e., 400 °C, produces lower amounts of carbides at the grain boundaries of the prior austenite.

3) The lower amounts shown in the specification are far less than the claimed upper limit of 0.5%.

4) What this means is that it is possible that the tempering of Hara and Miyata at 550 °C could produce amounts of carbide which would be close to the claimed upper limit of 0.5%, and, therefore, the position of inherency is factually supported.

The change in the carbide amount in the claims changes this issue. Now, the Examiner must assume that the tempering temperature of Hara and Miyata of 550 °C would produce a carbide amount of 0.13% by volume. Applicants submit that the Examiner has no factual basis to assume that this low amount is found in the steel of either Hara or Miyata. While it may be true that a tempering of 550 °C may produce a carbide amount that is less than the exemplified amount of 0.65% described in the specification, the Examiner must now assume that only a 50 degree difference (600 °C vs. 550 °C) in temperature would produce a reduction in carbide amount of a **third less**. Again, Applicants submit that there is no factual basis for making this assumption. If anything, the Declaration of record is evidence that tempering temperatures of 500-700 °C would provide a similar effect on the steel so that the one of skill in the art would expect a carbide amount generated at 550 °C tempering to be close to the 0.65% carbide amount present when the steel is tempered at 600 °C. Therefore, there is no basis for the Examiner to assume that the claimed carbide amount would be inherently found in the steels of Miyata and Hara. This means that a *prima facie* case of obviousness is not established by this prior art against the pending claims and the rejection needs to be withdrawn for this reason. If the

Examiner continues to insist that Miyata and Hara inherently possess the claim limitation regarding the carbide amount, the Examiner is requested to support such contention with explicit reliance on facts in the prior art and why a carbide amount of 0.13% by volume would be expected as a result of the processing of Miyata and Hara.

It is error to assume that the tempering temperature of Miyata overlaps that used in the invention.

In the rejection, the Examiner has taken the position that the Miyata teaches a tempering temperature substantially equal to the Ac1 point or lower and this disclosure means that there is overlap between the tempering temperature of Miyata and that employed by the invention. As previously argued, Miyata discloses tempering "at about 550 °C or higher to a temperature lower than the Ac1 point" and/or "heating in a dual phase region" is accompanied. The tempering temperature in the actual embodiments is 650 to 700 °C. From this disclosure of Miyata, it is not reasonable to interpret Miyata to teach a tempering temperature that has no lower limit and is one that should not substantially form intergranular carbides as specified in the claims.

The failure of the claims to specify the amount of carbides throughout the steel is not grounds for denying patentability.

In the previous response, Applicants argued via the Declaration that one would expect carbide precipitation when tempering in the 500-700 °C range. In spite of this, the Examiner has alleged that the level of carbide precipitation is still in question, stating, "The claims as written, allow for up to 0.5 volume percent of carbides in the grain boundaries of the prior austenite and do not specify what volume percent of carbides are present in the entire structure. Applicant has failed to show how much carbide precipitation is present in the grain boundaries of the prior austenite after tempering at 500 °C."

The Examiner's statement here misses the point of the invention and the intent of claiming the carbide amount in volume percent at the grain boundary of the prior austenite. The claimed invention specifies only carbides in the grain boundaries of the prior austenite (prior γ). The reason for this is found in paragraph [0069] of the published application, wherein it is stated "carbides precipitating in the grain boundaries causes the localized corrosion resistance to be reduced, whereas carbides inside the grains (intragranular) do not affect the corrosion performance; so it is sufficient to control the carbides in the grain boundaries of the prior γ" and "In the actual practice, carbides preferentially precipitate in the grain boundaries of prior austenite, so that when carbides should precipitate in the grain boundaries of prior austenite, the precipitation of carbides in the grain boundaries of prior γ preferentially occurs, whereas the precipitation inside the grain (intragranular) delays."

Therefore and according to the invention, no substantial precipitation of carbides, e.g., $M_{23}C_6$ type carbides, inside the grains is observed so that it is unnecessary to specify this amount. In this regard, the fact that the amount of carbides within the grains is not stated in the claims is irrelevant to the issue of patentability. The question is whether the prior art contains the stated limitation regarding the amount of carbides **at the grain boundaries of the prior austenite** and as stated above, this limitation is not present in Miyata or Hara and obviousness cannot be established based on this prior art.

The reasoning used to support the contention that the hardness limitation is present in Miyata and Hara is in error.

In addressing the hardness limitation, the Examiner takes the position that the tensile strength shown in Table 3 of 732 or less in Miyata, which equates to an HRC of 18.2, and that shown in Table 2 of Hara, i.e., 824 MPa, which equates to an HRC value of 23.5, are not

absolutes so that higher tensile strengths and therefore hardnesses are within the teachings of Miyata and Hara. Applicants submit that this reasoning is improper to support an allegation that the claimed hardness levels are present or somehow obvious based on the cited prior art.

What the Examiner has done is impermissibly place the burden of demonstrating patentability on Applicants when the prior art does not impose such a burden. With the Examiner's reasoning, Applicants are required to take the prior art of Miyata and Hara and prove that the claimed hardness levels cannot be met. This is not only an unfair burden but one that is not legally sustainable. It is the Examiner's burden to establish a *prima facie* case of obviousness and once this is done, Applicants are required to submit evidence and/or argument to rebut this presumption of obviousness. In the instant case, the Examiner does not have a basis to assume that the claimed hardness levels are present in either Hara or Miyata. Nevertheless, the Examiner is requiring Applicants to prove otherwise, which basically imposes a "devil's verification", wherein Applicants are required to check the infinite combinations outside the specified ranges and verify that the effects and/or features corresponding to the invention are not embodied. In fact, the Examiner has not met his burden of establishing that the claimed hardness levels are either found in Hara and Miyata or are obvious and for this reason, the rejections based on this prior art are also in error.

SUMMARY

To recap, Applicants submit that the rejection based on Woods is improper for the reason that Woods is directed to a cast steel, which does not have a plastically processed history. In addition, the reasoning for adding copper to the composition of Woods is improper. Further, the mere touching of C content is insufficient to render the claimed composition *prima facie* case of

obvious based the fact that Woods desires much higher C contents than that claimed. Lastly, the need for improving weathering in Woods to substantiate the need for copper is speculation on the Examiner's part.

The rejection based on Miyata and Hara is no longer valid in light of the change to the claims regarding the carbide amount. With this change and with the Declaration of record, the only reasonable conclusion is that the tempering of Miyata and Hara would not produce the low carbide amount of the claims. This means that the Examiner cannot continue to assert that Miyata and Hara inherently contain the carbide amount claim limitations. The rejection is also flawed based on the alleged overlap regarding C, the assertion that the tempering of the prior art is the same as that employed in the invention, and the position of inherency with respect to the claimed hardness.

In light of this response, the Examiner is respectfully requested to examine this application in light of this amendment, and pass claims 1-8 and 13-20 onto issuance.

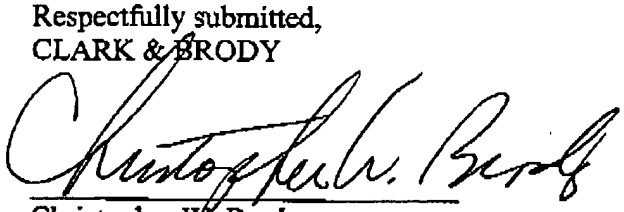
If the Examiner believes that an interview with Applicants' attorney would be helpful in expediting prosecution of this application, the Examiner is respectfully requested to telephone the undersigned at 202-835-1753.

Again, reconsideration and allowance of this application is respectfully requested.

The above constitutes a complete response to all issues raised in the Office Action dated May 22, 2009.

Please charge any fee deficiency or credit any overpayment to Deposit Account No. 50-1088.

Respectfully submitted,
CLARK & BRODY



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